



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

SMALLPOX EPIDEMIC AT EAGLE PASS, TEX., DURING THE WINTER OF 1917-18.

By C. R. ESKEY, Assistant Surgeon, United States Public Health Service.

From October 10, 1917, to March 8, 1918, 150 cases of smallpox were notified in Eagle Pass, Tex., a Mexican border town of an estimated population of 6,500, of which approximately 4,200 were Mexicans. On account of the virulence of the infection (the mortality of the cases being 22 per cent, in marked contrast to the milder types that more generally characterize smallpox outbreaks in the United States) and the availability of epidemiologic data secured, it may be not only of academic interest but some practical value to give a brief account of this epidemic.

Just across the Rio Grande from Eagle Pass is the town of Piedras Negras, Mexico, where there was also a very large epidemic of smallpox during the winter.¹ It is not known just when the epidemic began in Piedras Negras. On January 11, 1918, an authentic report was obtained stating that there were over 200 cases present on that date. No other official information was procured; but from a fairly reliable source it was learned that there had been over 300 deaths from smallpox in the Piedras Negras district during the first two months of this year. The district includes several very small towns besides Piedras Negras. From the number of deaths reported and other information received it is estimated that there were over 1,000 cases of smallpox in the district during the winter.

In both of these border towns smallpox is practically endemic. In Eagle Pass it is notified nearly every month in the year, and with the approach of winter it usually becomes epidemic. Last year 31 cases, with 6 deaths, were reported. This year the epidemics have been exceptionally large on both sides of the Rio Grande, because war conditions have produced a great unrest among the Mexican people in Texas. More than 13,000 Mexicans migrated to Mexico through this one port in the nine months ended March 31. As soon as the migrating families arrived in Mexico, where smallpox smoulders all the time, they were stricken in large numbers, because they had come from farming districts where smallpox had not been prevalent and where no attempt had been made to vaccinate them. The same conditions that operated with such violence in Piedras Negras and other Mexican communities were present in Eagle Pass, but in a much smaller degree. A large number of the 150 cases which occurred were among families that had recently moved to Eagle Pass, although not many of them brought the disease with them.

¹ A wagon and foot bridge connects the two towns, and over this passes most of the passenger traffic.

Type of Disease.

Both virulent and mild smallpox have been present during the epidemic. Mild cases occurred among those unvaccinated as well as sometimes among those with vaccination scars. The virulence decreased as the epidemic progressed, the number of deaths in the first 90 cases being 27, or 30 per cent, and in the last 60 cases 6 or 10 per cent.

Nine cases, or 6 per cent, were of the hemorrhagic type and were all fatal. Consanguinity appeared to be a factor in producing the hemorrhagic form, because all the members of two different families who were related by blood, with one exception, had the hemorrhagic type. In one family two brothers and their three children died of this fatal form, while their wives and a brother-in-law presented only the milder form. One child in this family group had the milder type. In another family group¹ two brothers and a sister died of hemorrhagic smallpox, while the wives, sick at the same time, developed the mild pustular disease.²

Smallpox Among Those Vaccinated.

Eight cases of smallpox are recorded as occurring in persons previously vaccinated. The interval between vaccination and sickness in these cases was as follows: One case, 1 year; one case, a year and a half;³ two cases, 7 years; three cases, 10 years; and one case, 25 years. One patient who had been vaccinated 7 years before, suffered from a fairly severe form of discrete smallpox; the others had very mild varioloid.

Second Attacks of Smallpox.

Reported second attacks of smallpox are very common in Eagle Pass, but absolute proof is always lacking. Four of the cases covered in this report claimed to have previously had the disease. One woman who had varioloid was able to show a few scars on her body that appeared to be old smallpox lesions. She said that she had had smallpox 30 years before. Another patient claimed to have had smallpox 20 years previously and said that he had been vaccinated at least five times without any reaction. In this connection it seems pertinent to mention the successful vaccination of two men at the United States quarantine station who both claimed to have had smallpox 30 years previously and who both had a few pits on their faces. If successful vaccination can be performed on a patient who has had smallpox, it seems that such a person, if not vaccinated, might be susceptible to a second attack.

¹ Only 1 of these cases is given in the figures for Eagle Pass, as the others were in Mexico when taken sick.

² In the first group the source of infection was the same in every case; but in the second the source is believed to have been different in the sister's case.

³ The scar that was only 1 year old was rather dubious in appearance, but the other short-period scar was typical.

Simultaneous Chicken Pox.

Coincident with the smallpox epidemic there has been a large number of cases of chicken pox, and this fact complicated the diagnosis of smallpox. In spite of the fact that all the doctors in Eagle Pass have had a large amount of experience with smallpox, they were often confused in distinguishing between these two diseases.¹ In handling varicella among the Mexican population the same measures were instituted as for smallpox. Even the yellow flag was placed at some of the houses. There is some danger, however, in allowing patients suffering from chicken pox to believe that they have smallpox, as they may not take the precaution of having vaccination performed. One such case had smallpox this winter.

Source of Infection.

Eleven cases came from Mexico during the incubation period of the disease and four other cases are believed to have had the infection carried to them from Mexico, either by visitors or by members of the family who frequented Piedras Negras.

Seven cases were traced to six different points in Texas, as follows: In October, one case came from Quemado, 14 miles from Eagle Pass and opposite Moral, Mexico, where smallpox had been flourishing and where illegal fording of the Rio Grande occurs at all times; in November, a case came from San Marcos; in January, one case came from Crystal City, about 50 miles from Eagle Pass, and one from Austin; in February, another case came from Crystal City and one from Floresville; in March, one case came from Cameto. All of these cases except one traveled overland, and it is possible that three of them contracted the disease while on their way to Eagle Pass. However, in four instances the patients were sick before starting on their journey and were transported from one town to another in the active stage of the disease.

Factors Tending to Spread Smallpox.

Unhygienic conditions.—No class of people lives under more unhygienic conditions than the greater part of the Mexican population of Eagle Pass, especially during the winter months, when often two or three families live in a one or two room shack. The worst case of overcrowding discovered was that of 15 persons living in a one-room hut. Nine of them contracted smallpox. In warm weather many families live in the open and others seek work in other communities, so that then both smallpox and overcrowding are at the minimum.

¹ Seven cases reported by the attending physician as smallpox have been discarded because they were doubtful or were proved beyond all doubt to be varicella. Only one case of chicken pox was received at the isolation camp established by the health officer, and this one was soon discharged.

Promiscuous visiting.—Mexicans, particularly the old women, are frequent visitors on both the sick and the dead, and relatives will caress the dead as well as the sick, no matter what disease is present. An undertaker reports that while he was preparing a dead smallpox case for burial in Piedras Negras last winter, 25 different persons visited the room to view the dead body. In another instance, when the health officer visited the house, a large number of persons were found viewing the corpse of a case of smallpox which had been concealed.¹

Concealment of cases.—The one factor above all others that tends to maintain and cause the spread of smallpox in Eagle Pass is concealment of the cases from the health authorities. As will be seen in Table No. 1, nine cases were hidden until the premises were inspected by the health officer because of a death at the house or because of the large number of smallpox cases occurring in the vicinity without any known source:

TABLE NO. 1.—*Results of concealment of cases of smallpox.*

[Cases grouped together are on the same premises.]

Case No.	Number of days concealed	Number of secondary cases.
1.....	27	14
2.....	19	
5.....	10	
6.....	7	1
8.....	10	
64.....	15	2
66.....	23	13
80.....	15	
81.....	15	
Total, 9.....		50

One-third of the cases during the past winter have had their source traced to concealed cases, and no doubt a number of other cases would have been similarly traced if correct information could have been obtained. There is no means of ascertaining how many other concealed cases occurred. There is a local law for the prosecution of householders where hidden cases of smallpox are found, but thus far it has never been enforced.

Delayed reporting.—Eight cases of smallpox were not reported until seven or more days after the patients were taken sick and, practically, should be considered as concealed cases, the only difference being that notification was finally made. Delay in these cases was because a doctor was not called until late or, as was most usually the case, because the report was made by some one living in the neighborhood of the sick person.

¹ A rumor that this patient died under peculiar circumstances had increased the neighbors' curiosity.

Transporting smallpox.—Moving people sick with smallpox from town to town, as mentioned above, and from one part of town to another, is no small factor in causing the spread of this disease.

Method of Infection.

The following table gives all data obtainable regarding the means of infection during the epidemic. The largest percentage of the cases was traced to direct contact.

TABLE 2.—*Method of infection.*

Method.	Number of cases.	Percentage.
Contact infection.....	51	34
Cases due to carriers.....	21	14
House infection.....	6	4
Cases of origin known but method of infection unknown.....	45	30
Source and method unknown.....	27	18

The cases due to carriers are listed under the same heading whether persons or animals acted in this capacity. Ten cases which occurred in October are believed to have been infected by a dog belonging to the family in which the first two cases of the epidemic occurred.¹ All other means of infection were ruled out in these cases. As nearly every Mexican family owns one or more dogs, probably many other cases could be attributed to this cause. Two children were infected by Mexican women who had been nursing the sick. In one case a quarantine guard is believed to have carried the disease to his child. The remaining 8 cases are supposed to have been due to carriers who had visited the sick in Eagle Pass and Mexico, and probably other cases were due to the same cause.

Cases grouped under "house infection" in the above table are those in which smallpox had been notified in the same house at some time previously and no other means of infection could be traced.² It is possible that some other method operated in these cases.

Attitude of Mexicans Toward Vaccination.

Although somewhat well informed as to the benefits to be derived from vaccination against smallpox, the Mexican population of Eagle Pass seldom seek vaccination, especially when there is no epidemic, in which respect they do not differ from the American inhabitants. The more ignorant believe that vaccination during an epidemic will

¹ This dog played with two cases of smallpox for about four weeks before their occurrence was known. Every day during this period the dog made frequent visits to the houses in which secondary cases subsequently developed and in several instances is known to have played with children who later sickened. The dog slept almost every night at the home of a family in which two of these cases developed. The dog was often on a lawn and porch where a 7-months old American child, who later developed the disease, played every afternoon.

² In the first two cases reported smallpox had occurred in the home twice before and everyone who had ever lived on the premises had suffered from the disease.

cause the disease, and this belief prevents many from seeking vaccination at such times. There were at least 5 cases in the 150 who attributed their sickness to vaccination. The lower incidence of the disease among the American residents¹ is quite largely due to the fact that they are not likely to harbor any false ideas about vaccination and nearly always seek it as soon as they find smallpox prevalent.

Incubation Period.

In Table No. 3 the incubation periods are given for 36 cases of smallpox. The interval which elapsed between the first day of sickness of the primary case and the onset of sickness in the secondary cases occurring in the same house was computed. In all of these cases immediate contact with the sick was highly probable.

TABLE 3.—*Incubation periods.*

Number of days between exposure and sickness.	Number of cases.	Number of deaths.	Ages.
10.....	3		2, 10, 12.
11.....	2		2, 24.
12.....	1		4.
13.....	2	1	4, 6.
14.....	6	4	4, 7, 8, 20, 25, 42.
15.....	5		2, 5, 6, 7, 8.
16.....	4		4, 5, 8, 30.
17.....	5	2	1½, 4, 4, 5, 25.
18.....	3		2, 3, 20.
19.....	1	1	5.
23.....	2	1	8, 10.
24.....	1		4 months.
26.....	1		Do.

The shortest incubation period is given as 10 days. There were two cases in which the incubation period was apparently only eight days; but as it was possible that a mistake had been made in the designation of the primary case, they were omitted from the table. The longest incubation periods noted were those of two 4-months' old babies. This lessened susceptibility to disease or lessened chance of exposure was noted in the case of several other very young babies.² In the other cases age appears to have played no part in determining the length of the incubation. The incubation period in the hemorrhagic cases was the same as in the cases of ordinary smallpox. In this form it varied from 14 to 20 days.

Mortality.

Thirty-three deaths occurred among the 150 cases, a mortality of 22 per cent. Nine of the fatal cases were due to the hemorrhagic form of smallpox. Two fatal cases were due to abortions complicating the disease. The only other known pregnant woman having the

¹ During the period covered by this report only four Americans had smallpox. Of these, three who had not been vaccinated were stricken during the first week of the epidemic.

² One 2-months' old baby was continually in the presence of two smallpox cases and yet was not taken sick.

disease not only survived, but gave birth to a healthy baby about one month after onset of symptoms.

Lack of proper medical treatment is believed to have materially increased the mortality during the epidemic. Seventy-seven cases treated at the isolation camp under the supervision of the health officer had a mortality of only 12.9 per cent, while the cases treated in their homes had a mortality of 31.5 per cent. In a few instances death occurred so suddenly that there was no time to move the case to the camp.

The first striking feature noticed when visiting the homes of the sick Mexicans was the great caution exercised to prevent any fresh air from entering the sick room. The attendants often objected to the opening of the door wide enough for one to enter the room. If it were not for the poor construction of most of the houses, the patients would practically smother.

Being such a common disease among Mexicans, smallpox is regarded rather lightly, despite its great death toll, and therefore home medication with old herb remedies and patent medicines is the chief treatment given the sick.¹ An exceedingly small number of Mexican cases received the advice of a physician throughout their sickness.

As the following table will indicate, the greatest death rate occurred in the female sex above the age of 15 and the smallest in the male sex below that age.

TABLE No. 4.—*Mortality as to sex.*

	Females.			Males.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
Under 15 years.....	52	11	21.2	51	5	9.8
Over 15 years.....	28	11	39.3	19	6	31.5
Total.....	80	22	27.5	70	11	15.7

The following table gives the mortality for different age groups:

TABLE No. 5.—*Mortality for age groups.*

Ages (years).	Number of cases.	Number of deaths.	Percentage.
0 to 5.....	58	10	17.2
6 to 10.....	33	5	15.1
11 to 15.....	13	1	7.6
16 to 20.....	11	4	36.3
21 to 25.....	14	5	35.7
26 to 30.....	10	2	20.0
31 to 35.....	4	1	25.0
36 to 40.....	4	3	75.0
41 to 45.....	2	1	50.0
46.....	1	1	100.0

¹ One fatal outcome from home treatment was reported in which the patient, who was apparently convalescing very satisfactorily, received a dose of horse liniment and died in a short time.

Prevention of Introduction of Smallpox from Mexico.

Vaccination.—For over two years the United States Public Health Service has maintained a force at Eagle Pass for vaccinating passengers from Mexico. In Table No. 6 will be found the results of revaccination, as followed up in over 200 cases. In the column under abortive reaction are those cases in which the reaction was not as marked as the ordinary primary reaction.

TABLE NO. 6.—*Results of revaccination.*

Lapse of time since former vaccination.	Failures.	Reactions.		
		Abortive.	Positive.	Reactive.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
2 to 7 years.....	82.8	7.8	9.4	17.2
7 to 15 years.....	82.9	7.1	10.0	17.1
Over 15 years.....	41.7	16.6	41.7	58.3

Vaccination at the time of entry did not prevent eight individuals from later coming down with smallpox. These cases were admitted while in the incubation period of the disease.¹ It was therefore seen that more stringent measures were necessary to prevent smallpox from being introduced from Mexico, and instructions were issued that all passengers from Mexico who had never been immunized against smallpox should be vaccinated and returned to Mexico until vesicle formation, at least, had occurred. Since this measure has been in effect only one case of smallpox has come from Mexico to Eagle Pass, and this case was passed because the quarantine inspector thought the person had had smallpox. People claiming to have had smallpox have been passed without vaccination, if they were able to demonstrate a few old cicatrices. However, as it developed that there was some danger in admitting anyone without vaccination who did not have unquestionable evidence of former smallpox, vaccination is now being performed on a large number of this doubtful type of passengers.²

¹ Eighteen days was the longest interval which elapsed from the time of vaccination until the onset of smallpox and the next longest period was 9 days. Two days was the shortest period. In three cases vaccination was successful in that a typical reaction occurred. Two children who were vaccinated on the second and third days before being taken sick had typical vaccine vesicles formed at the time of the smallpox eruption. In the third case vaccination was performed, with a typical reaction following, 9 days before the onset of smallpox and 2 days after exposure to smallpox in Mexico (the patient had been visiting in Mexico for 2 days). In this case the patient suffered from a very severe form of smallpox and died on the fourteenth day. In two instances children were vaccinated, respectively, 11 and 10 days before the onset of sickness and 4 days after exposure. The vaccinations matured typically and perfect scar formation occurred. The children had very mild varioloid.

² Besides the 8 cases mentioned above, 3 other cases occurring in Eagle Pass during the winter contracted smallpox in Mexico (crossing to this country during the incubation period of the disease). Two were children in a Mexican family of five, all of whom crossed without being inspected for vaccinations because of having a false passport. The other case was that of the man passed by the quarantine inspector because he thought he had had smallpox.

Disinfection of baggage.—All baggage brought from Mexico and belonging to the laboring class has been disinfected with steam, except in the case of certain articles that steam would destroy. Baggage belonging to any family in which there is evidence of recent smallpox is also treated with steam.

Disinfection of clothing.—The typhus-fever preventive measures, which require bathing of all passengers who are liable to harbor vermin and steam sterilization of their clothing, have probably helped in no small way to prevent the carrying of smallpox from Mexico.

Preventing dogs crossing bridge.—As it is believed that pets, especially dogs, are liable to spread smallpox, measures were taken to prevent these animals from crossing the bridge connecting Eagle Pass with Piedras Negras.

Efforts to prevent illegal entry of Mexicans.—The border is patrolled by both United States soldiers and Texas Rangers in an effort to prevent illegal entry of Mexicans. A large number of Mexicans have been apprehended fording the Rio Grande, but probably only a small proportion of those crossing in this way. Whether or not any of the cases of smallpox occurring in Eagle Pass during the past winter entered illegally or were due to carriers who entered illegally could not be ascertained.

Measures Taken to Control Smallpox in Eagle Pass.¹

Quarantine measures.—As soon as a case of smallpox is reported the house is visited by the health officer or one of the quarantine guards and a yellow flag is placed on the premises. As these flags were often difficult to find, even when one knew that smallpox was present in a certain neighborhood, early in the epidemic large placards with the word "smallpox" printed on them were also placed on the front doors of the infected houses. In addition, the gates to the yards were closed by wiring, all dogs on the premises were chained, and the family was instructed how to conduct itself. There is no law which permits complete quarantine of the house if there are wage earners present, provided the patient be isolated in a separate room; but in practically every instance members of the quarantined family who wished outside intercourse moved, so that the entire premises could be quarantined as described above. School children in the family were not allowed to attend school. The children of an entire neighborhood were kept from school during part of the epidemic. To enforce the quarantine measures guards were placed at

¹ Eagle Pass does not have a city health officer, but depends on the county health officer to institute all measures for the control of contagious diseases. As Eagle Pass is the only town in Maverick County, the health officer is able to devote nearly all of his time to it. The present county health officer has retired from active practice and devotes his whole time to county work. Besides the health officer, guards are employed to enforce local quarantine measures, five being employed at one time during the past winter.

the quarantined homes, except when the health officer believed that the family would observe his directions.

Isolation camp.—As soon as it was evident that an epidemic was present the local health officer requested that he be allowed to use the tents and camp utensils owned by the Public Health Service for an isolation camp. Permission was granted by the Surgeon General. During the epidemic 77 cases of smallpox were taken to the camp (about half the total number). As there is no local law in Eagle Pass which could be used to force patients to go to the camp, it was necessary to gain the patient's consent. He could frequently be cajoled into going.

In handling the patients at the camp no nurses or other attendants for the sick were employed. When a sick person was moved to the camp, most of the other members of the family went with him, so that the mothers or other relatives could attend the sick. In a few instances, other members of the family were taken sick with smallpox several days after reaching the camp.

Compulsory vaccination.—This measure, which is supervised by the county health officer, is required of all children attending the public schools in Eagle Pass. The value of this measure is evident from the fact that only one case of smallpox (a mild case) developed among the school children, who number about 800. Several children attending a parochial school and a private school, neither of which was as closely supervised as the public schools, were taken sick with smallpox during the epidemic. Where possible, persons in the family where a case of smallpox occurred and in the immediate neighborhood were vaccinated.

Disinfection of premises.—Sulphur was used for the disinfection of some houses before they were released from quarantine, but many places were so poorly constructed that this means of disinfection would have been of no value. Such houses were scrubbed out well and the furniture was moved out into the sun for a day or more. Old mattresses were generally burned. Families were instructed to boil all bedding and other clothing that could be treated in this way. All persons at the isolation camp had their clothing boiled before discharge.

Assistance rendered by the Public Health Service.—At the beginning of the epidemic a notice was published to the effect that persons so desiring would be vaccinated without charge at the Public Health Service Station in Eagle Pass. Over 200 local residents were so vaccinated. Several wagonloads of household goods were steam sterilized for local people. Some of the patients and their nurses were treated at the service station after being discharged from quarantine.

Measures to Prevent Interstate Spread of Smallpox.

With the cooperation of the Immigration Service, the working class of Mexicans, many of whom are being shipped to different points in the United States from Eagle Pass, have been kept under a close surveillance and must have a ticket from the Public Health Service, showing that they have been disinfected and vaccinated before departing for the interior of the country.¹

Acknowledgment.

The preceding report is based to a great extent upon data furnished by Dr. Charles Tarver, Maverick County health officer. The Public Health Service officer in charge of the quarantine work at Eagle Pass visited most of the cases covered by the report. No doubt there are errors in some of the material upon which the report is based, as the Mexican people were very indifferent about giving any information concerning themselves. However, by the use of indirect questioning a fair degree of accuracy was insured.

ANNUAL MEETING OF AMERICAN PUBLIC HEALTH ASSOCIATION.

The annual meeting of the American Public Health Association will be held at Chicago, with headquarters in the Hotel Morrison, on October 14-17, 1918. Among the speakers will be Surg. Gen. Gorgas, Col. Victor C. Vaughan, and Maj. William H. Welch, of the Army Medical Corps; George E. Vincent, president of the Rockefeller Foundation; Dr. Charles J. Hastings, president of the American Public Health Association; Asst. Surgs. Gen. J. W. Schereschewsky, B. S. Warren, and Allan J. McLaughlin, United States Public Health Service; and Drs. W. A. Evans, Ernest S. Bishop, Lee K. Frankel, and Frederick L. Hoffman. The preliminary program for the meetings is as follows:

Program of the General Sessions.

Presidential address. Charles J. Hastings, M. D., Toronto, Ontario.

Team-play for Public Health. George E. Vincent, president, Rockefeller Foundation, New York City.

Address: (Subject to be announced). W. C. Gorgas, Surgeon General, United States Army.

Preservation of the Health of the Civil Population during the War. Victor C. Vaughan, colonel, Medical Corps, National Army.

Some Public Health Problems and Opportunities Created by the War. William H. Welch, major, Medical Corps, National Army.

The Accomplishments of Public Health. Statistical and Historical Evidence. Frederick L. Hoffman, Ph. D., statistician, Prudential Life Insurance Co., Newark, N. J.

¹The disinfection of these people consists of steam sterilization of their clothing and baggage, and bathing of the person. During the bath they are inspected for vaccinations.